

CLAIMS

That which is claimed is:

1. A method of reducing bacterial virulence, comprising:
contacting bacteria with an agent that alters the bacteria's native level of DNA methyltransferase (Dam) activity thereby altering the bacteria's native level of methylation of adenine in a GATC tetranucleotide of the bacteria, and thereby inhibiting virulence of the bacteria.
2. The method of claim 1, wherein the agent reduces the bacteria's native level of DNA methyltransferase activity.
3. The method of claim 1, wherein the agent reduces the Dam activity by reducing the bacteria's level of expression of Dam.
4. The method of claim 1, wherein the agent reduces the Dam activity by blocking a Dam interaction site.
5. The method of claim 1, wherein the agent increases the bacteria's native level of DNA methyltransferase activity.
6. The method of claim 1, wherein the agent reduces the bacteria's native level of methylated adenine in a GATC tetranucleotide by inhibiting DNA methyltransferase activity.
7. The method of claim 1, wherein the agent increases the bacteria's native level of methylated adenine in a GATC tetranucleotide by increasing DNA methyltransferase activity.
8. The method of claim 1, wherein the agent binds a Dam enzyme.
9. The method of claim 1, wherein the agent binds a native sequence of a bacteria and decreases expression of Dam below a normal level.

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10. The method of claim 1, wherein the agent binds a native sequence of a bacteria and increases expression of Dam above a normal level.

11. The method of claim 1, wherein the agent alters Dam activity of a pathogenic bacteria selected from the group consisting of *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Haemophilus somnus*, *Actinobacillus pleuropneumoniae*, *Pasteurella multocida*, *Mannheimia haemolytica*, *NT Haemophilus influenzae*, *Helicobacter pylori* and *Shigella* spp.

12. The method of claim 1, wherein the agent alters native Dam activity of a pathogenic bacteria selected from the group consisting of *Escherichia*, *Vibrio*, *Yersinia* and *Salmonella*.

13. The method of claim 12, wherein the pathogenic bacteria are a salmonella bacteria selected from the group consisting of *S. typhimurium*, *S. enteritidis*, *S. typhi*, *S. abortus-ovi*, *S. abortus-equi*, *S. dublin*, *S. gallinarum*, and *S. pullorum*.

14. The method of claim 12, wherein the pathogenic bacteria are *E. coli*.

15. The method of claim 12, wherein the bacteria are *V. cholerae*.

16. The method of claim 12, wherein the bacteria are *Y. pseudotuberculosis*.

17. The method of claim 12, wherein the bacteria are selected from the group consisting of *Shigella*, *Haemophilus*, *Bordetella*, *Neisseria*, *Pasteurella* and *Treponema*.

18. The method of claim 1, wherein the bacteria are *Haemophilus*.

19. A method of reducing pathogenicity of a pathogenic bacteria, comprising:
administering an agent that alters a pathogenic bacteria's native DNA adenine methylase (Dam) activity thereby altering the bacteria's native DNA methylation activity to an extent that the bacteria's pathogenicity is reduced.

20. The method of claim 19, wherein the agent reduces the Dam activity by reducing the bacteria's level of expression of Dam.

21. The method of claim 19, wherein the agent reduces the Dam activity by blocking a Dam interaction site.

22. The method of claim 19, wherein the agent increases Dam activity.

23. The method of claim 19, wherein the agent decreases Dam activity.

24. A method of treating a bacterial infection, comprising the steps of:
administering to a subject infected with a pathogenic bacteria a therapeutically effective amount of a composition comprising a pharmaceutically acceptable carrier and an active agent that alters the bacteria's native level of DNA methyltransferase (Dam) activity; and
allowing the agent to contact the bacteria for a period of time and under conditions so as to inhibit proliferation of the bacteria.

25. The method of claim 24, wherein the agent reduces the Dam activity by reducing the bacteria's level of expression of Dam.

26. The method of claim 24, wherein the agent reduces the Dam activity by blocking a Dam interaction site.

27. The method of claim 24, wherein the agent reduces the level of Dam activity thereby reducing methylation of adenine in a GATC tetranucleotide in the bacteria, thereby inhibiting virulence of the bacteria.

28. The method of claim 24, wherein the agent increases the level of Dam activity thereby increasing methylation of adenine in a GATC tetranucleotide in the bacteria, thereby inhibiting virulence of the bacteria.

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29. The method of claim 24, wherein the subject is a mammal.

30. The method of claim 24, wherein the subject is a human.

31. The method of claim 24, wherein the administering is by a route selected from the group consisting of oral, injection, inhalation and topical.

32. A method for treating bacterial infection comprising administering an agent that reduces the level or activity of a DNA methyltransferase thereby reducing methylation of adenine in a GATC tetranucleotide in the bacteria, thereby inhibiting the virulence of the bacteria.

33. The method of claim 32, wherein the reduction of the level of methylated adenine in a GATC tetranucleotide is effected by inhibiting DNA methyltransferase activity.

34. A composition for controlling bacterial pathogenicity, comprising:
a carrier; and
a compound that alters native DNA adenine methylase (Dam) activity.

35. The composition of claim 34, wherein the carrier is a pharmaceutically acceptable carrier.

36. The composition of claim 34, wherein the agent binds a Dam enzyme.

37. The composition of claim 34, wherein the agent which binds a native sequence of a bacteria and decreases expression of Dam below a normal level.

38. The composition of claim 34, wherein the agent which binds a native sequence of a bacteria and increases expression of Dam above a normal level.

39. The composition of claim 34, wherein the bacteria is a pathogenic bacteria selected from the group consisting of *Streptococcus pneumoniae*, *Neisseria meningitidis*,

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Haemophilus somnus, Actinobacillus pleuropneumoniae, Pasteurella multocida, Mannheimia haemolytica, NT Haemophilus influenzae, Helicobacter pylori and Shigella spp.

40. The composition of claim 34, wherein the agent alters native Dam activity of a pathogenic bacteria selected from the group consisting of *Escherichia*, *Vibrio*, *Yersinia* and *Salmonella*.

41. The composition of claim 40, wherein the pathogenic bacteria are a salmonella bacteria selected from the group consisting of *S. typhimurium*, *S. enteritidis*, *S. typhi*, *S. abortus-ovi*, *S. abortus-equi*, *S. dublin*, *S. gallinarum*, and *S. pullorum*.

42. The composition of claim 40, wherein the pathogenic bacteria are *E. coli*.

43. The composition of claim 40, wherein the bacteria are *V. cholerae*.

44. The composition of claim 40, wherein the bacteria are *Y. psuedotuberculosis*.

45. The composition of claim 40, wherein the bacteria are selected from the group consisting of *Shigella*, *Haemophilus*, *Bordetella*, *Neisseria*, *Pasteurella* and *Treponema*.

46. The composition of claim 45, wherein the bacteria are *Haemophilus*.